

WO 2004/058814

497047kxr.ST25.txt  
SEQUENCE LISTING

<110> THE HORTICULTURE AND FOOD RESEARCH INSTITUTE OF NEW ZEALAND LIMITED

<120> ENZYMES AND POLYNUCLEOTIDES ENCODING THE SAME

<130> 497047 KXR

<150> NZ 523384

<151> 2002-12-24

<160> 16

<170> PatentIn version 3.1

<210> 1

<211> 2019

<212> DNA

<213> Actinidia deliciosa

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&lt;210&gt; 2

&lt;211&gt; 565

&lt;212&gt; PRT

&lt;213&gt; Actinidia deliciosa

&lt;400&gt; 2

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Thr Thr Ser Ile Glu Pro Pro His Val Thr Arg Arg Ser Ala Asn Tyr
20          25          30

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497047kxr.ST25.txt

His Pro Ser Ile Trp Gly Asp His Phe Leu Ala Tyr Ser Ser Asp Ala  
 35 40 45

Met Glu Glu Glu Val Ile Asn Met Glu Gln Gln Gln Arg Leu His His  
 50 55 60

Leu Lys Gln Lys Val Arg Lys Met Leu Glu Ala Ala Ala Glu Gln Ser  
 65 70 75 80

Ser Gln Met Leu Asn Leu Val Asp Lys Ile Gln Arg Leu Gly Val Ser  
 85 90 95

Tyr His Phe Glu Thr Glu Ile Glu Thr Ala Leu Arg His Ile Tyr Lys  
 100 105 110

Thr Cys Asp Tyr His Phe Asp Asp Leu His Thr Ala Ala Leu Ser Phe  
 115 120 125

Arg Leu Leu Arg Gln Gln Gly Tyr Pro Val Ser Cys Asp Met Phe Asp  
 130 135 140

Lys Phe Lys Asn Ser Lys Gly Glu Phe Gln Glu Ser Ile Ile Ser Asp  
 145 150 155 160

Val Gln Gly Met Leu Ser Leu Tyr Glu Ala Thr Cys Leu Arg Ile His  
 165 170 175

Gly Glu Asp Ile Leu Asp Glu Ala Leu Ala Phe Thr Ile Thr Gln Leu  
 180 185 190

Arg Ser Ala Leu Pro Asn Leu Ser Thr Pro Phe Lys Glu Gln Ile Ile  
 195 200 205

His Ala Leu Asn Gln Pro Ile His Lys Gly Leu Thr Arg Leu Asn Ala  
 210 215 220

Arg Ser His Ile Leu Phe Phe Glu Gln Asn Asp Cys His Ser Lys Asp  
 225 230 235 240

Leu Leu Asn Phe Ala Lys Leu Asp Phe Asn Leu Leu Gln Lys Leu His  
 245 250 255

Gln Arg Glu Leu Cys Glu Ile Thr Arg Trp Trp Lys Asp Leu Asn Phe  
 260 265 270

Ala Lys Thr Leu Pro Phe Ala Arg Asp Arg Met Val Glu Cys Tyr Phe  
 275 280 285

497047kxr.ST25.txt

Trp Ile Leu Gly Val Tyr Phe Glu Pro Gln Tyr Leu Leu Ala Arg Arg  
 290 295 300

Met Leu Thr Lys Val Ile Ala Met Ile Ser Ile Ile Asp Asp Ile Tyr  
 305 310 315 320

Asp Val Tyr Gly Thr Leu Glu Glu Leu Val Leu Phe Thr Asp Ala Ile  
 325 330 335

Glu Arg Trp Glu Ile Ser Ala Leu Asp Gln Leu Pro Glu Tyr Met Lys  
 340 345 350

Leu Cys Tyr Gln Ala Leu Leu Asp Val Tyr Ser Met Ile Asp Glu Glu  
 355 360 365

Met Ala Lys Gln Gly Arg Ser Tyr Cys Val Asp Tyr Ala Lys Ser Ser  
 370 375 380

Met Lys Ile Leu Val Arg Ala Tyr Phe Glu Glu Ala Lys Trp Phe His  
 385 390 395 400

Gln Gly Tyr Val Pro Thr Met Glu Glu Tyr Met Gln Val Ala Leu Val  
 405 410 415

Thr Ala Gly Tyr Lys Met Leu Ala Thr Ser Ser Phe Val Gly Met Gly  
 420 425 430

Asp Leu Ala Thr Lys Glu Ala Phe Asp Trp Val Ser Asn Asp Pro Leu  
 435 440 445

Ile Val Gln Ala Ala Ser Val Ile Gly Arg Leu Lys Asp Asp Ile Val  
 450 455 460

Gly His Lys Phe Glu Gln Lys Arg Gly His Val Ala Ser Ala Val Glu  
 465 470 475 480

Cys Tyr Ser Lys Gln His Gly Thr Thr Glu Glu Glu Ala Ile Ile Glu  
 485 490 495

Leu Asp Lys Gln Val Thr His Ser Trp Lys Asp Ile Asn Ala Glu Cys  
 500 505 510

Leu Cys Pro Ile Lys Val Pro Met Pro Leu Leu Ala Arg Val Leu Asn  
 515 520 525

Leu Ala Arg Val Leu Tyr Val Ile Tyr Gln Asp Glu Asp Gly Tyr Thr  
 530 535 540

497047kxr.ST25.txt

His Pro Gly Thr Lys Val Glu Asn Phe Val Thr Ser Val Leu Ile Asp  
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Ser Met Pro Ile Asn  
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&lt;210&gt; 3

&lt;211&gt; 1815

&lt;212&gt; DNA

&lt;213&gt; Actinidia deliciosa

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&lt;210&gt; 4

&lt;211&gt; 1897

&lt;212&gt; DNA

<213> *Actinidia deliciosa*

&lt;400&gt; 4

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&lt;210&gt; 5

&lt;211&gt; 491

&lt;212&gt; PRT

&lt;213&gt; Actinidia deliciosa

&lt;400&gt; 5

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Met Gln Leu Pro Cys Ala Gln Ala Leu Pro Ile Pro Thr Val Thr Thr
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Asn Thr Ser Ile Glu Pro Pro His Val Thr Arg Arg Ser Ala Asn Tyr
20          25          30

```

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His Pro Ser Ile Trp Gly Asp His Phe Leu Ala Tyr Ser Ser Asp Ala
35          40          45

```

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Met Glu Glu Glu Asp Ile Asn Met Glu Gln Gln Gln Arg Leu His His
50          55          60

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Leu Lys Gln Lys Val Arg Lys Met Leu Glu Ala Ala Ala Glu Gln Ser
65          70          75          80

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497047kxr.ST25.txt

Ser Gln Met Leu Asn Leu Val Asp Lys Ile Gln Arg Leu Gly Val Ser  
85 90 95

Tyr His Phe Glu Thr Glu Ile Glu Thr Ala Leu Arg His Ile Tyr Lys  
100 105 110

Thr Cys Asp Tyr His Phe Asp Asp Leu His Thr Ala Ala Leu Ser Phe  
115 120 125

Arg Leu Leu Arg Gln Gln Gly Tyr Pro Val Ser Cys Asp Met Phe Asp  
130 135 140

Lys Phe Lys Asn Ser Lys Gly Glu Phe Gln Glu Ser Ile Ile Ser Asp  
145 150 155 160

Val Arg Gly Met Leu Ser Leu Tyr Glu Ala Thr Cys Leu Met Ile His  
165 170 175

Gly Glu Asp Ile Leu Asp Glu Ala Leu Ala Phe Thr Ile Thr Gln Leu  
180 185 190

Arg Ser Ala Leu Pro Asn Leu Ser Thr Pro Phe Lys Glu Gln Ile Ile  
195 200 205

His Ala Leu Asn Gln Pro Ile His Lys Gly Leu Thr Arg Leu Asn Ala  
210 215 220

Arg Ser His Ile Leu Phe Phe Glu Gln Asn Asp Cys His Ser Lys Asp  
225 230 235 240

Leu Leu Asn Phe Ala Lys Leu Asp Phe Asn Leu Leu Gln Lys Leu His  
245 250 255

Gln Arg Glu Leu Cys Glu Ile Thr Arg Glu Ile Ser Ala Leu Asp Gln  
260 265 270

Leu Pro Glu Tyr Met Lys Leu Cys Tyr Gln Ala Leu Leu Asp Val Tyr  
275 280 285

Ser Met Ile Asp Glu Glu Met Ala Lys Gln Gly Arg Ser Tyr Cys Val  
290 295 300

Asp Tyr Ala Lys Ser Ser Met Lys Ile Leu Val Arg Ala Tyr Phe Glu  
305 310 315 320

Glu Ala Lys Trp Phe His Gln Gly Tyr Val Pro Thr Met Glu Glu Tyr  
325 330 335



497047kxr.ST25.txt

Met Gln Val Ala Leu Val Thr Ala Gly Tyr Lys Met Leu Ala Thr Ser  
 340 345 350

Ser Phe Val Gly Met Gly Glu Leu Ala Thr Lys Glu Ala Phe Asp Trp  
 355 360 365

Val Ser Asn Asp Pro Leu Ile Val Gln Ala Ala Ser Val Ile Gly Arg  
 370 375 380

Leu Lys Asp Asp Ile Val Gly His Lys Phe Glu Gln Lys Arg Gly His  
 385 390 395 400

Val Ala Ser Ala Val Glu Cys Tyr Ser Lys Gln His Gly Thr Thr Glu  
 405 410 415

Glu Glu Ala Ile Ile Glu Leu Tyr Lys Gln Val Thr His Ser Trp Lys  
 420 425 430

Asp Met Asn Ala Glu Cys Leu Cys Pro Thr Lys Val Pro Met Pro Leu  
 435 440 445

Leu Ala Arg Val Leu Asn Leu Ala Arg Val Leu Tyr Val Ile Tyr Gln  
 450 455 460

Asp Ala Asp Gly Tyr Thr His Ser Gly Thr Lys Val Lys Asn Phe Val  
 465 470 475 480

Thr Ser Val Leu Ile Asp Ser Met Pro Ile Asn  
 485 490

&lt;210&gt; 6

&lt;211&gt; 565

&lt;212&gt; PRT

&lt;213&gt; Actinidia deliciosa

&lt;400&gt; 6

Met Gln Leu Pro Cys Ala Gln Ala Leu Pro Ile Pro Thr Val Thr Thr  
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Asn Thr Ser Ile Glu Pro Pro His Val Thr Arg Arg Ser Ala Asn Tyr  
 20 25 30

His Pro Ser Ile Trp Gly Asp His Phe Leu Ala Tyr Ser Ser Asp Ala  
 35 40 45

497047kxr.ST25.txt

Met Glu Glu Glu Asp Ile Asn Met Glu Gln Gln Gln Arg Leu His His  
 50 55 60

Leu Lys Gln Lys Val Arg Lys Met Leu Glu Ala Ala Ala Lys Gln Ser  
 65 70 75 80

Ser Gln Met Leu Asn Leu Val Asp Lys Ile Gln Arg Leu Gly Val Ser  
 85 90 95

Tyr His Phe Glu Thr Glu Ile Glu Thr Ala Leu Arg His Ile Tyr Lys  
 100 105 110

Thr Cys Asp Tyr His Phe Asp Asp Leu His Thr Ala Ala Leu Ser Phe  
 115 120 125

Arg Leu Leu Arg Gln Gln Gly Tyr Pro Val Ser Cys Asp Met Phe Gly  
 130 135 140

Lys Phe Lys Asn Cys Lys Gly Glu Phe Gln Glu Ser Ile Ile Ser Asp  
 145 150 155 160

Val Arg Gly Met Leu Ser Leu Tyr Glu Ala Thr Cys Leu Arg Ile Arg  
 165 170 175

Gly Glu Asp Ile Leu Asp Glu Ala Leu Ala Phe Thr Thr Thr Gln Leu  
 180 185 190

Gln Ser Ala Leu Pro Asn Leu Ser Thr Pro Ile Lys Glu Gln Ile Ile  
 195 200 205

His Ala Leu Asn Gln Pro Ile His Lys Trp Leu Thr Arg Leu Asp Ala  
 210 215 220

Arg Arg His Ile Leu Phe Phe Glu Gln Asn Asp Cys His Gly Lys Asp  
 225 230 235 240

Leu Leu Asn Phe Ala Lys Leu Asp Phe Asn Ser Leu Gln Lys Leu His  
 245 250 255

Gln Arg Glu Leu Cys Glu Ile Thr Arg Trp Trp Lys Asp Leu Asp Phe  
 260 265 270

Ala Lys Lys Leu Pro Phe Ala Arg Asp Arg Met Val Glu Cys Tyr Phe  
 275 280 285

Trp Ile Leu Gly Val Tyr Phe Glu Pro Gln Tyr Leu Arg Ala Arg Arg  
 290 295 300

## 497047kxr.ST25.txt

Met Leu Thr Lys Val Ile Ala Leu Thr Ser Ile Ile Asp Asp Ile Tyr  
 305 310 315 320

Asp Val Tyr Gly Thr Leu Glu Glu Leu Val Leu Phe Thr Asp Ala Ile  
 325 330 335

Glu Arg Trp Glu Ile Ser Ala Leu Asp Asn Leu Pro Asp Tyr Met Lys  
 340 345 350

Leu Cys Tyr Gln Ala Leu Leu Asp Val Tyr Ser Met Ile Asp Glu Glu  
 355 360 365

Met Ala Lys Gln Gly Arg Ser Tyr Cys Val Asp Tyr Ala Lys Ser Ser  
 370 375 380

Met Lys Ile Leu Val Arg Ala Tyr Phe Glu Glu Ala Lys Trp Phe His  
 385 390 395 400

Gln Gly Tyr Val Pro Thr Met Glu Glu Tyr Met Gln Val Ala Leu Val  
 405 410 415

Thr Ala Gly Tyr Lys Met Leu Ala Thr Ser Ser Phe Val Gly Met Gly  
 420 425 430

Glu Leu Ala Thr Lys Glu Ala Phe Asp Trp Val Ser Asn Asp Pro Leu  
 435 440 445

Ile Val Gln Ala Ala Ser Val Ile Gly Arg Leu Lys Asp Asp Ile Val  
 450 455 460

Gly His Lys Phe Glu Gln Lys Arg Gly His Val Ala Ser Ala Val Glu  
 465 470 475 480

Cys Tyr Ser Lys Gln His Gly Thr Ile Glu Glu Glu Ala Ile Ile Glu  
 485 490 495

Leu Asp Lys Gln Val Thr His Ser Trp Lys Asp Ile Asn Ala Glu Cys  
 500 505 510

Leu Cys Pro Ile Lys Val Pro Met Pro Leu Leu Ala Arg Val Leu Asn  
 515 520 525

Leu Ala Arg Val Leu Tyr Val Ile Tyr Gln Asp Glu Asp Gly Tyr Thr  
 530 535 540

His Ser Gly Thr Lys Val Lys Asn Phe Ala Thr Ser Val Leu Ile Asp  
 545 550 555 560

497047kxr.ST25.txt

Ser Met Pro Ile Asn  
565

&lt;210&gt; 7

&lt;211&gt; 686

&lt;212&gt; DNA

&lt;213&gt; Actinidia chinensis

&lt;400&gt; 7

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&lt;210&gt; 8

&lt;211&gt; 190

&lt;212&gt; PRT

&lt;213&gt; Actinidia chinensis

&lt;400&gt; 8

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Tyr Cys Val Asp Tyr Ala Lys Ser Ser Met Lys Ser Leu Val Arg Ala
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Tyr Phe Glu Glu Ala Lys Trp Phe His Gln Gly Tyr Val Pro Thr Met
20          25          30
Glu Glu Tyr Met Gln Val Ala Ile Val Thr Gly Ala Tyr Lys Ile Leu
35          40          45

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497047kxr.ST25.txt

Ala Thr Thr Ser Phe Val Gly Met Gly Glu Leu Ala Thr Lys Glu Val  
 50 55 60

Phe Asp Trp Val Ser Asn Asp Pro Leu Ile Val Gln Ala Ala Ser Ile  
 65 70 75 80

Val Ser Arg Leu Thr Asp Asp Ile Val Gly His Lys Phe Glu Gln Lys  
 85 90 95

Arg Gly His Val Ala Ser Ala Val Glu Cys Tyr Met Lys Gln His Gly  
 100 105 110

Thr Thr Glu Glu Glu Ala Ile Val Glu Leu Tyr Lys Gln Val Thr Asn  
 115 120 125

Ala Trp Lys Asp Met Asn Ala Glu Cys Leu Phe Pro Thr Lys Val Pro  
 130 135 140

Met Pro Leu Leu Val Arg Val Leu Asn Leu Ala Arg Val Ile Asn Val  
 145 150 155 160

Leu Tyr Lys Asp Glu Asp Gly Tyr Thr His Ser Arg Thr Lys Val Lys  
 165 170 175

Lys Phe Val Thr Ser Val Leu Val Asp Phe Val Pro Ile Ser  
 180 185 190

&lt;210&gt; 9

&lt;211&gt; 755

&lt;212&gt; DNA

&lt;213&gt; Vaccinium corymbosum

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 aatctcagtg cttatcgatt ctgtgccgat caattagcaa acagtagtcc taacttaa 540

497047kxr.ST25.txt

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aatctgttgg cttataactt tataagtgtc gtgaaatgtt ctagtgaact tggtaaggat    600
gtatttccga tatgtagctc tatctccact gtacggttgt aatcttgctc tcttctacta    660
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&lt;210&gt; 10

&lt;211&gt; 171

&lt;212&gt; PRT

<213> *Vaccinium corymbosum*

&lt;400&gt; 10

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Glu Ala Lys Trp Phe His Glu Gly Tyr Val Pro Ser Met Glu Glu Tyr
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```

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Met Arg Val Ala Leu Val Thr Gly Ala Tyr Lys Met Leu Ala Thr Thr
          20           25           30

```

```

Ser Phe Val Gly Met Gly Asp Leu Val Thr Lys Glu Ala Phe Glu Trp
          35           40           45

```

```

Val Ser Ser Asp Pro Leu Ile Val Glu Ala Ala Ser Val Ile Cys Arg
50           55           60

```

```

Leu Met Asp Asp Met Ala Gly His Lys Phe Glu Gln Glu Arg Gly His
65           70           75           80

```

```

Val Ala Ser Ala Val Glu Cys Tyr Met Lys Gln His Gly Ala Thr Gln
          85           90           95

```

```

Glu Val Val Leu Leu Glu Phe Lys Lys Arg Val Thr Asn Ala Trp Lys
          100          105          110

```

```

Asp Met Asn Ala Glu Cys Leu Arg Pro Thr Ala Val Pro Met Pro Leu
          115          120          125

```

```

Leu Thr Arg Val Leu Asn Leu Ala Arg Val Ile Asn Val Ile Tyr Lys
130           135          140

```

```

Asp Glu Asp Gly Tyr Thr His Ser Gly Thr Lys Leu Lys Asn Phe Val
145           150          155          160

```

```

Ile Ser Val Leu Ile Asp Ser Val Pro Ile Asn
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```

497047kxr.ST25.txt

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&lt;211&gt; 26

&lt;212&gt; DNA

&lt;213&gt; Synthetic primer

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&lt;210&gt; 12

&lt;211&gt; 25

&lt;212&gt; DNA

&lt;213&gt; Synthetic primer

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25

&lt;210&gt; 13

&lt;211&gt; 20

&lt;212&gt; DNA

&lt;213&gt; Synthetic primer

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20

&lt;210&gt; 14

&lt;211&gt; 20

&lt;212&gt; DNA

&lt;213&gt; Synthetic primer

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&lt;210&gt; 15

&lt;211&gt; 20

&lt;212&gt; DNA

497047kxr.ST25.txt

&lt;213&gt; Synthetic primer

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20

&lt;210&gt; 16

&lt;211&gt; 20

&lt;212&gt; DNA

&lt;213&gt; Synthetic primer

<400> 16  
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20